

ABSTRACT

In this thesis work, we have addressed the problem of conservation and restoration of the cultural heritage and monuments. These are always on the threat of theft, natural calamities and human-made situations. Cultural heritage and monuments are the symbols of one's identity and pride. Preservation and restoration of these have a positive impact on the economic, cultural, environmental and educational growth of any communities. We have addressed this problem by proposing 3D digital restoration and preservation technique. For this purpose, we 3D scanned the artefacts of Lothal and Dholavira. Both are Harappan Civilization and located in Gujarat, India. We also 3D scanned temples of Dwarka, Gujarat. Additionally, we have created an online repository for the same. It is not possible to scan a complete structure in a single iteration. Hence multiple scans need to be captured, followed by efficient and robust registration. Further, this digital model can be 3D printed. In another work, we have tried to solve an industrial problem of tiles fitting on the roof. Often the surface requires partial tiles to install, and hence it becomes crucial to estimate the tiles count, partial tiles' shape and dimensions and the visualization of the tiles, on the roof surface. Also determining the roof plane is a challenging task. 3D image Registration is one of the first steps required for this task. Iterative Closest Point (ICP) is the state of the art method for registration, but it relies on the initial alignment between two scans and hence prone to local minimum. Its accuracy is not good when there is a partial overlap between the point cloud. Thus we have approached this problem by using deep learning techniques.